

Family of Muzzle Brakes and Suppressors for Rifle and Carbine (FMBS-R/C)

- 1. Scope.** The scope of this document covers performance specifications of the Weapons Accessories (WPNA) Program Family of Muzzle Brakes and Suppressors (FMBS) for Special Operations Forces (SOF) fielded Rifles and Carbines.

The Weapons Accessories Program Office is procuring muzzle brakes/ flash suppressors and sound suppressors for the SOF fielded Rifles and Carbines. These shall be Commercial-Off-The-Shelf (COTS), modified COTS, or Non-Developmental Items (NDI). The suppressors should exhibit improvements over the standard Quick Detach Sound Suppressor (QDSS, NSN 1005-01-437-0324) and the Knight's Armament Company (KAC) Mk11 Suppressor (NSN 1005-LL-L99-6022).

- 1.1. Purpose.** Improvements are sought in materials, manufacturing processes, high endurance coatings, and other unknown technologies that yield extended performance suppressor life under various firing schedules simulating Special Operations combat.
- 1.2. Baseline System.** The M4A1 with 10.3" barreled Upper Receiver Group, with no flash suppressor/muzzle brake, the Mk17 with the CQB barrel with no muzzle device, the M27 with no flash suppressor/muzzle brake, the M16A4 with no flash suppressor/muzzle brake, and the Mk13 Mod 5(fitted with the current Mk11 Mod 0 suppressor) are the baseline systems.
- 1.3. Maturity of Technology.** New and combined capabilities as well as improvements on existing capabilities are of interest. The FMBS acquisition effort seeks to rapidly develop, test, and field a system in a timeframe relevant to current conflicts. The FMBS acquisition seeks systems that require only Engineering and Manufacturing Development (EMD) to become technically qualified and operationally suitable to enter combat.

2. Applicable Documents.

2.1. Government Documents

Specifications and Standards The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

Standards, Military:

Federal Standard 595B
MIL-STD-130N
MIL-STD-40051-2
MIL-STD-810G

MIL-DTL-71186A

Colors Used In Government Procurement
Identification Marking of U.S. Military Property
DOD Standard Practice Technical Manuals
Environmental Engineering Considerations and Laboratory Tests
Detail Specification, Carbine, 5.56 Millimeter – M4A1

TOP 3-2-045 Automatic Weapons, Machineguns, and Hand and Shoulder
Fired Weapons

MIL-DTL-32309 Detail Specification, M16A4, dated 5 August 2009

Other Documents:

SOPMOD ORD United States Special Operations Command (USSOCOM)
Operational Requirements Document (ORD) for the Special
Operations Peculiar Modification (SOPMOD) Kit for the
M4A1 Carbine, 29 October 1999

USSOCOM Special Text “Special Operations Peculiar Modification (SOPMOD)
Accessory Kit for the M4A1 Carbine”, ST 23-31-1, 30 January
1999.

SCAR JORD Joint Operational Requirements Document for the Special
Operations Combat Assault Rifle, dated 28 March 2007

Family of Muzzle Brakes and
Suppressors Annex Annex to “USSOCOM (SSOR) Memo, Revised Special
Operations Peculiar Modification (SOPMOD) Kit for the
M4A1 Carbine, 29 October 1999, with ORD Revision 5”,
dated 29 March 2004

SOPMOD Quick Detach Sound Suppressor Kit Serviceability Field Inspection Procedure,
28 Jan 2004

2.2. Order of Precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained. Copies of military specifications and standards are available from: Standardization Document Order Desk, 700 Robbins Ave., Bldg #4, Section D, Philadelphia, PA 19111-5094.

3. Requirements

3.1. Basic Terminology

3.1.1. Thresholds/Objectives. Performance parameters and features in this specification are assigned numerical or verbal values for Key Performance Parameters (KPPs) and Key System Attributes (KSAs). In some instances, desired or Objective (**O**) requirements that exceed the minimum requirements of this specification are listed in conjunction with the minimum or Threshold (**T**) requirements. In these instances, the threshold and objective parameters will be annotated as such. If no (**T**) or (**O**) is assigned, the value stated is (**T**).

3.1.2. Key Performance Parameters (KPPs). KPPs are those attributes or characteristics of a system that are considered critical or essential to the development of an effective military capability and those attributes that make a significant contribution to

the characteristics of the future joint force. The KPPs are attributes that contribute most significantly to operational capability and are usually in threshold (T) -objective (O) format. Specifications labeled (KPP) must be met prior to production and fielding at the (T) level of performance or better. Failure to meet a KPP will prevent production and fielding.

3.1.3. Key System Attributes (KSAs). Attributes or characteristics considered crucial in support of achieving a balanced solution/approach to a key performance parameter or some other key performance attribute deemed necessary by the sponsor. Offerors failing to meet any KSA as stated in the technical proposal as being met must be met prior to production.

3.1.4. Other Performance Attributes (OPAs). Specifications labeled (OPA) represent desirable performance attributes or features. Specifications which have no markings to denote (KPPs) or (KSAs) are by default, (OPAs). Meeting or exceeding the specifications for OPAs (or the intent of the OPAs) may add source-selection value to a proposal. The OPAs exhibit high and low values or tolerance ranges.

3.2. Applicable Host Weapons. The Rifle/Carbine FMBS is intended for use on the M4, M4A1, Mk18 CQBR, M16A4, M27 IAR, Mk16 CAR-L (formerly SCAR-L), Mk17 CAR-H (formerly SCAR-H), and the Mk13 Mod 5/6/7/8 weapon systems using existing munitions, and SOF enhanced rounds.

3.3. Go/No-Go

3.3.1. Compatibility. The FMBS-R/C shall interface with designated host weapons, with the exception of the Blank Firing Adapter (NSN 1005-00-118-6192) and the Bayonet (NSN 1005-00-073-9238). The FMBS-R/C will not interfere with the fit, function or safe operation of the host weapons when employing WPNAC/SOPMOD accessories (reference Table 1-1), for the life of the suppressor. (G-NG)

Table 1-1 List of WPNAC Accessories

WEAPON ACCESSORY	NSN
SU-230/230A /PVS	1240-01-533-0939 / 1240-01-545-5813
SU-231/231A /PEQ	1240-01-533-0941 / 1240-01-587-9345
SU-253/PEQ	1240-01-566-2844
SU-233/PVS	5855-01-533-0996
LA-5/A /PEQ	5855-01-533-0555 / 5855-01-545-3659
AN/PVS-24/24A	5855-01-533-0940 / 5855-01-558-3616
SU-232/PAS	5855-01-533-0557
AN/PSQ-18A	1010-01-516-0953
M203/A1 9" Barrel Assy.	1010-01-410-7422
M320/A1	1010-01-566-9083 / 1010-01-557-2542
Mk13 EGLM	1010-13-119-8614
RIS II URG 10.3"	1090-01-D12-0981
RIS II URG 12.25"	1090-01-D12-0983
RIS II URG 14.5"	1090-01-D12-0985
Dual Pressure Pad Remote Switch	Part No. RMT-400-A8

Vertical Forward Grips	1005-01-D12-0686 / 1005-01-580-6261
------------------------	-------------------------------------

3.3.2. Reliability. Safe Operation of the host weapon includes the reliability of the host weapon. The FMBS-R/C will not decrease the required reliability of the SOF host weapon. It will not adversely alter the rate of fire or recoil velocity of the bolt/bolt carrier/op rod assembly. The threshold for the reliability of the FMBS-R/C will be equal to the documented threshold reliability of the host weapon. The documented host weapon reliability is stated in Table 1-2. **Reliability** - is an ability of a system to perform/maintain its functions in routine and also in different hostile and/or unexpected circumstances. Not applicable for the MK13. **(G-NG)**

Table 1-2 Reliability documented in MIL-DTL-71186A & SCAR JORD Rev. 3

RELIABILITY FROM HOST WEAPON DOCUMENT

The weapon shall fire 6,000 rounds of M855, 5.56mm ball cartridge in accordance with drawing 9342868. There shall be no more than the number of malfunctions and unserviceable parts allowed in Table 1.

Table 1

Malfunctions (1)	Single Carbine (7)	Four Carbines (7)
Failure of Bolt to Lock (2)	2	4
Failure to Fire	2	4
Failure to Feed (from Mag)	4	9
Failure to Eject	2	4
Failure to Chamber	3	7
Failure to Extract	1	2
Bolts Fails/hold rear	3	8
All other malfunctions (4)	0	0
Totals	9	22
Unserviceable Parts (1)	Minimum Life Rounds (5)	Four Carbines Combined (6)
Ejector Spring	3,000	2
Extractor Spring	2,000	1
Other Parts (3)	3,000	1
Total Unserviceable Parts (above unserviceable parts combined)		3

M4/M4A1/CQBR
MIL-DTL-71186A
&
M16A4
MIL-DTL-32309
dated 5 August 2009

- (1) All malfunctions and unserviceable parts occurring during the test shall be recorded and properly identified regardless of whether they are chargeable to the weapon. Malfunctions that are traceable to components determined unserviceable after meeting minimum life round requirements may be replaced and charged against the weapon. Once verified that previously recorded malfunctions are attributable to the unserviceable part, they shall not be counted against the weapon provided they occurred within the previous 200 rounds of firing. Malfunctions determined not to be chargeable to the weapon as a result of failure analysis shall be verified and shall not be counted.
- (2) In the event of any failure of bolt to lock malfunction, the forward assist assembly shall be operated. Failure of the forward assist assembly to remain engaged with the bolt carrier assembly during manual attempt to lock bolt shall be considered an additional malfunction in the category of "other malfunctions".
- (3) Other parts shall be limited to trigger spring, disconnect springs, hammer spring, extractor pin and extractor.
- (4) Other malfunctions include, but are not limited to: occurrence of doubling (two shots fired with a single trigger pull) during semi-automatic firings; failure to immediately stop firing when the trigger is released (uncontrolled fire) during automatic firing; and failure of forward bolt assist assembly to remain engaged with bolt carrier assembly during manual attempt to lock the bolt, loosening of the nuts securing the carrying handle assemble to the upper receiver, etc.
- (5) Minimum life rounds is defined as the minimum service life of an individual part, whether it is the original part or a replacement part, expressed in the number of weapon rounds fired with the part assembled in the weapon. For example, an extractor spring failing prior to firing 3,600 rounds on a new weapon, has not met the minimum life rounds. The failure shall be recorded and shall be cause for test failure.
- (6) The allowable number of serviceable parts shown for 4 weapons combined

	<p>(7) applies only to parts failing after the minimum life rounds have been fired on the weapon. For example, ejector springs failing at 3,500 rounds on one weapon, and 4,100 rounds on a second weapon, fall within the allowable limits of 2 unserviceable parts on 4 weapons combined however, failure of an ejector spring on a third weapon after firing 3,000 rounds which exceeds the allowance, shall be cause for test failure.</p> <p>(8) Each individual weapon tested shall not exceed the allowable number for each malfunction in the list or the test shall have failed. When the weapon meets the individual allowable malfunctions and exceeds the cumulative total allowable malfunctions for a weapon, the test shall have failed. The combined four weapons tested shall not exceed the allowable number for each malfunction in the list or the test shall have failed. When the weapons meet the combined four weapons allowable malfunctions in the list and exceed the cumulative total allowable malfunctions for four weapons, the test shall have failed.</p> <p>During the endurance functioning test (see 3.6.7.1), the cyclic rate of fire of the weapon shall be obtained. The cyclic rate of fire of not more than one reading on a single weapon or not more than two readings on four weapons combined shall fall outside of 700 to 1025 rounds per minute. Ammunition used shall be Government standard M855, 5.56mm ball cartridges shall be in accordance with drawing 9342868.</p>
<p>Mk16 CAR-L & Mk17 CAR-H <u>JORD ver. 3</u></p>	<p>In threshold caliber configurations (5.56mm NATO and 7.62mm NATO, with M855 and M80 ball ammunition respectively) (T), spirally developed/alternate caliber configurations (O), shall have a Mean Round Between Stoppages (MRBS) of 2,000 rounds (T), 8,000 rounds (O).</p> <p>In threshold caliber configurations (T), spirally developed/alternate caliber configurations (O), shall have a Mean Round Between Failure (MRBF) of 15,000 rounds (T), 35,000 rounds (O).</p> <p>In threshold caliber configuration/ball ammunition (T), spirally developed/alternate caliber configurations (O), will have a fully functional service life without overhaul for a minimum of 15,000 rounds (T), 90,000 rounds (O) for the weapon and 15,000 rounds (T), 35,000 rounds (O) for the barrel.</p> <p>The cyclic rate of fire unsuppressed shall not fall outside of 625 to 655 rounds per minute, suppressed 575 to 675 rounds per minute.</p>
<p><u>IAR (M27) ORD</u></p>	<p>--Firing Schedule. The ammunition used for system reliability testing shall be DODIC A059 or equivalent. Firing shall alternate between thirty (30) rounds fired in automatic mode in 3 to 5 round bursts and thirty (30) rounds fired in semi-automatic mode. Firing shall be at a rate between 12-30 rounds per minute in semi-automatic and automatic mode.</p> <p>--Maintenance Schedule. The weapons shall be wiped and lubricated every 600 rounds using the appropriate cleaners and lubricants identified in 3.5.2. The weapons shall be disassembled, fully cleaned, visually inspected, and lubricated every 1,200 rounds.</p> <p>--Failure Definition. A failure is any of the following, when attributable to the weapon:</p> <ol style="list-style-type: none"> A stoppage in weapon function not caused by trigger manipulation; A failure to stop firing when the trigger is released; A malfunction where the weapon does not operate in accordance with design intent; A visually observed crack in the bolt, barrel extension, or barrel. <p>--Failure Classifications</p> <p>Class I: A failure that may be immediately corrected by the operator within 10 seconds or less while following prescribed immediate action procedures.</p> <p>Class II: A failure that may be corrected by the operator, and that requires more than 10 seconds but not more than 10 minutes to correct (less the TM/OM defined cool down period if a hot barrel condition exists). Only the equipment and tools issued with the weapon may be used to correct the failure.</p> <p>Class III: A failure of a severe nature. The failure (1) can be corrected by an operator but requires more than 10 minutes, (2) cannot be corrected by an operator and requires assistance (no time limit), or (3) requires a higher level of maintenance, or correction by an</p>

	<p>authorized operator cannot be accomplished because of unavailability of necessary tools, equipment or parts.</p> <p>--Failure Scoring (Design Verification only). If one or more Class I and/or Class II failures are found to be related to an unserviceable part, scoring shall be as follows.</p> <p>a. If the unserviceable part is found during scheduled maintenance (every 600 rounds), all failures shall be scored as one failure. In the event that both Class I and Class II failures were previously scored because of the unserviceable part, the failures shall be scored as a single Class II failure.</p> <p>b. If unscheduled maintenance is performed to correct the problem, replacement of the unserviceable part shall be scored as a Class III failure and the related Class I and/or Class II failures not scored.</p> <p>A part determined to be unserviceable during the scheduled maintenance (every 600 rounds) shall be replaced and not scored as a reliability failure. However, for each weapon, more than 3 changes of the same part shall result in failure to meet the reliability requirement. Unserviceable parts discovered after the reliability firing is completed shall not be scored as a reliability failure.</p> <p>--Design Verification only. N/A</p> <p>--Production Acceptance only. N/A</p> <p>--Conformance Inspection only. One rifle from every third lot shall fire 15,000 rounds. To be acceptable, there shall be no more than 16 Class I and II combined failures and no more than 1 Class III failure.</p> <p>--Barrel Life. The Precision in Semi-automatic Fire verification procedure (see 4.3.3) shall be performed after every 2,400 rounds fired during the reliability tests conducted at ambient conditions (for each verification effort: Design Verification, Production Acceptance, and Conformance Inspection). A barrel shall be considered unserviceable once any of the following criteria is observed:</p> <p>a. The mean velocity of any 20 consecutive rounds in a burst drops 200 ft/s or more below the mean velocity of the first 20 rounds fired.</p> <p>b. The precision in semi-automatic fire exceeds 5 MOA (AEVS or AEHS exceeds 5.72 inches at 328 feet (100m)).</p> <p>c. Cracks develop in the barrel.</p> <p>--Production Acceptance only. N/A</p> <p>--Conformance Inspection Only. One rifle from every third lot, starting with the first lot, shall fire 15,000 rounds. This test will be done in conjunction with the System Reliability test (see 4.5.1.8).</p> <p>--Weapon Orientation. N/A</p> <p>The acceptable rate of fire for the M27 is 850 to 900 rounds per minute.</p>
--	--

3.4. Key Performance Parameters

3.4.1. Mount & Flash Suppression. The M4/M4A1/CQBR, Mk16, Mk17, M27, M16A4 flash suppressors shall use standard current configuration threads specific to each SOF host weapon. When the sound suppressor is removed, the flash suppressor on the host weapon shall exhibit 85% (T) 98% (O) flash reduction over the baseline system. When the sound suppressor is attached, the host weapon shall exhibit 75% (T) on first shot, and 85% (T) 98% (O) flash reduction on all other shots, over the baseline system. (KPP)

Any fixtures required to mount the suppressor may not extend more than 2.0 (+ 1.0, -0.1) inches (T), 1.5 (+ 0.75, -0.1) (O) inches past the crown of the muzzle. (KPP)

3.4.1.1. The MK13 variant suppressor shall attach to the host weapon over a muzzle brake adapter or other muzzle device that reduces felt recoil compared to the baseline MK13 system in the unsuppressed configuration (T). The muzzle brake

adapter/muzzle device shall attach to a host barrel having a minimum diameter of .700" at the muzzle and may not extend more than 2.0 (+ 1.0, -0.1) inches (T), 1.5 (+ 0.75, -0.1) (O) inches past the crown of the muzzle. The muzzle brake adapter/muzzle device shall not increase the visible and IR flash signature compared to the baseline MK13 system in the unsuppressed configuration (T)

3.4.2. Over The Beach (OTB) Capability. The Mk16 & Mk 17 shall have a quick detach/attach, sustained fire and OTB capable sound suppressor (T). The Mk 17 shall have a zero drain time OTB sound suppressor capable of shooting horizontal or vertical (O). (KPP)

3.4.3. Physical Characteristics.

3.4.3.1. Diameter.

3.4.3.1.1. The M4/M4A1/CQBR, Mk16 CAR-L, M27 & M16A4 sound suppressor shall be less than 1.85 (+ 0.35, -0.00) inches concentric to the bore (T), less than 1.35 (+ 0.25, -0.00) inches (O). (KPP)

3.4.3.1.2. The Mk17 CAR-H sound suppressor shall be 1.5 (+ 0.80, -0.00) inches concentric to the bore (T) less than 1.5 inches (O). (KPP)

3.4.3.1.3. The MK13 sound suppressor shall be equal to or less than 2.0 inches concentric to the bore (T). (KPP)

3.4.3.2. Length.

3.4.3.2.1. M4/M4A1/CQBR, Mk16, M27, M16A4 & Mk17 sound suppressor shall have a maximum added length of 6.6 (+ 1.00, -0.00) inches forward of the muzzle crown (T), 5.0 (+ 1.00, -0.00) inches (O). (KPP)

3.4.3.2.2. The MK13 sound suppressor shall add no more than 8.5 inches (T), 6 inches (O) to the length of the weapon. (KPP)

3.4.3.3. Weight.

3.4.3.3.1. M4/M4A1/CQBR, Mk16, M27, M16A4 & Mk17 sound suppressor shall weigh no more than 24 (+ 0.5) ounces (T) 20 (+ 0.5) ounces (O). (KPP)

3.4.3.3.2. The MK13 sound suppressor shall weigh no more than 32 ounces (T), no greater than 24 ounces (O). (KPP)

3.4.4. Sound Reduction.

3.4.4.1. M4/M4A1/CQBR, Mk16, M27, M16A4 & Mk17 sound suppressor shall lower the average peak sound pressure level (SPL) 25db (-1.0) (T) 28db (-1.0) (O) when compared with the average unsuppressed weapon SPL. (KPP)

3.4.4.2. The MK13 sound suppressor shall lower the peak SPL to no greater than 140dB (T), no greater than the sonic crack of the round at the muzzle (O). (KPP)

3.4.5. Accuracy. The attachment of the M4/M4A1/CQBR, Mk16, M27, M16A4, Mk17 and Mk13 sound suppressor shall not degrade inherent accuracy of the weapon to which it is attached, throughout the life of the sound suppressor in accordance with MIL-DTL-71186A. Degradation of accuracy will be determined by measuring the mean radius of each group when alternately firing a weapon without a sound suppressor then firing that weapon with a sound suppressor attached. The average mean radius of the suppressed groups will not exceed the average mean radius of the unsuppressed groups within 0.20 inches. (KPP)

3.4.6. Point of Impact Shift.

3.4.6.1. The M4/M4A1/CQBR, Mk16, M27, M16A4 & Mk17 sound suppressor shall provide an operationally suitable interface that is easy to use and provides a repeatable and predictable shift of impact within 2.0 minutes of angle (MOA) (T), 1.0 minute of angle, or less (O). (KPP)

3.4.6.2. The MK13 sound suppressor shall provide an operationally suitable interface that is easy to use and provides a predictable shift of impact no greater than 1.5 MOA repeatable when tested at 600 yards (T), less than 1.0 MOA repeatable when tested at 600 yards (O). (KPP)

3.4.7. Serial Number. Each suppressor shall have an individual serial number applied pursuant to MIL-STD-130N (T). (KPP)

3.4.8. Suppressor Attachment and Removal. The attachment and removal of the sound suppressor shall not require tools of any kind (T). (KPP)

3.5. Key System Attributes

3.5.1. Endurance/Durability. The useful life of the sound suppressor is 3000 (T) 5000 (O) rounds. The useful life of the suppressor ends after one (1) muzzle strike or baffle strike, a loss of suppression below the threshold dB, or a loss of accuracy of the weapon, as described in 3.2.5. A muzzle strike is defined as a deformation of the suppressor material caused by the impact of the fired projectile while it passes through the end of the suppressor. A baffle strike is defined as a deformation of the suppressor material caused by the impact of the fired projectile while it moves through the inside of the baffles. (KSA)

3.5.1.1. Catastrophic Failure. In the event of a catastrophic failure the sound suppressor shall remain intact and attached to the weapon, e.g. no portion of or the suppressor itself shall be expelled in such a manner as to become a hazard to the shooter or other friendly personnel in the vicinity of the suppressor during the failure. The suppressor shall remain fixed onto the host weapon until is removed by the operator or a qualified armorer (without the use of any tools). (KSA)

3.5.1.2. End of Life Accuracy. Accuracy will be tested at the end of the useful life of the suppressor, in accordance with host weapon's required accuracy as stated in MIL-DTL-71186A, MIL-DTL-32309 dated 5 August 2009, SCAR JORD ver. 3, and IAR ORD. The FMBS-R/C will retain its accuracy requirement throughout its useful life (Req. 3.2.5) of the average mean radius of the suppressed groups will not exceed the average mean radius of the unsuppressed groups within 0.20 inches. **(KSA)**

3.5.2. Maintenance. The FMBS-R/C shall require no maintenance. **(KSA)**

3.5.3. Corrosion Resistance. The FMBS-R/C shall be constructed of corrosion resistant materials or shall be protected with a durable corrosion resistant coating, which are abrasion, impact and battlefield chemical resistant. The materials and coating shall protect all suppressor components from degradation in all SOF climatic environments and weather conditions, including Chemical, Biological, Radiological, and Nuclear (CBRN) environments (see table 1-4). The coating shall minimize the attraction of dust and contamination with organic material. **(KSA)**

Table 1-3. Environmental Requirements

Environmental Factor	Recommended test Severity	Reference	Remarks
Humidity	+30°C/+60°C, 85-95 % RH, 96 hours	MIL-STD-810G Method 507.5, Procedure II	
Immersion	66 feet of salt water for 2 hours	MIL-STD-810G Method 512.5, Procedure I	
Ice	Ice 20 mm (6+13) thickness	MIL-STD-810G Method 521.3	Ice removal is permitted.
Salt fog	5 % NaCl, +35°C for 48 hours	MIL-STD-810G Method 509.5	

3.5.3.1. Water Proof. The FMBS-R/C shall not be damaged or altered in any way by submersion to 20.1 meters (66 feet) seawater or equivalent pressure (29.4 PSIg) for 2 hours. **(KSA)**

3.5.4. Drop Test. The installed FMBS-R/C shall withstand drop testing without degradation of the point of impact, from 1 meter onto plywood backed by concrete; individually in 5 orientations, will be dropped muzzle down, muzzle up, at 45 Degrees muzzle down, 45 Degrees butt down, flat on one side. Optics will not be included in this test. **(KSA)**

3.5.5. Color. All external and visible surfaces shall be coated with a dull/non-reflective

coating (T). The external color objective is Flat Dark Earth (O). The Flat Dark Earth color shall be similar to, within + 3 shades, FED-STD-595B Flat, Earth #30277. Interpretation of color is subjective, therefore a “target” and range is provided. The Objective Pantone® Target Color is 7504M (O). The color range shall include the light extreme, Pantone® 465M, and the dark extreme, Pantone® 7505M. (KSA)

3.5.6. Operational Suitability/User Ergonomics.

3.5.6.1. Gloved hand. The sound suppressor shall be usable with Cold Weather gloves (NSN 8415-00-227-1220) or Nomex Flight Gloves (NSN 8415-01-029-0113), or any other military issued gloves. (KSA)

3.5.6.2. Blowback. Installation of the FMBS shall not adversely affect operator effectiveness due to objectionable increases in: 1) blowback of noxious gases, 2) debris ejected toward the operator or bystanders, or 3) flash emanating from the FMBS interface to the rifle. (KSA)

3.5.6.3. Felt Recoil. The attachment of the FMBS will not increase felt recoil when used in conjunction with the host weapon. (KSA)

3.5.6.4. Heat Mirage. The FMBS will incorporate design features that reduce or mitigate the heat mirage seen by the operator while using optics, sights or scopes. (KSA)

3.5.6.5. Night Vision Device “White-Out”. The FMBS will reduce the flash signature of the host weapon, as seen through Gen 3, or better, Night Vision Equipment. (KSA)

3.5.7. Operator’s Manual and Transport Case. The contractor shall provide an operator’s manual with each unit (T) conforming to the requirements of MIL-STD-40051-2. In addition to a hard copy manual, an electronic version of the manual in Microsoft Word™, complete with line drawings, shall be supplied. The Operator’s Manual shall be no larger than 4 ½ X 6 inches. The Operator’s Manual shall contain, as a minimum, an equipment description, mounting instructions, operating procedures, zeroing procedures and other adjustments (if applicable), inspection, cleaning, field level maintenance procedures, repair parts list, a top level drawing, warranty information, and any pertinent safety instructions.

The FMBS-R/C must survive military methods of transport/infiltration to include High Mobility Multipurpose Wheeled Vehicle (HMMWV), cargo aircraft, helicopters, static line airborne operations, Fast Boats, and Submersible Diving Vehicles (SDVs). The contractor shall provide a storage and transport case for each unit meeting the aforementioned transport conditions. (KSA)

3.6. Other Performance Attributes.

3.6.1. Ozone Depleting Chemicals (ODC). ODCs shall be avoided whenever possible. (OPA)

3.6.2. Chemical Compatibility. FMBS-R/C components shall not deteriorate due to exposure to solvents used in weapon cleaning. The FMBS-R/C maintenance manual shall define compatible oils and solvents. **(OPA)**

3.6.3. Quality Assurance Procedures. FMBS-R/C contractors shall develop Quality Assurance Provisions for the respective FMBS-R/C subsystem and for any component elements integrated into the total subsystem. These Quality Assurance Provisions shall include at least, but not only, manufacturing and assembly controls as well as procedures for factory acceptance tests which includes actual function fire and structural integrity inspection, such as Magnetic Particle, Dye Penetrant, etc. **(OPA)**

3.6.4. Quality Control and Production Acceptance Plans. The FMBS-R/C contractors shall develop the Quality Control and Acceptance Plans on serial production lots. The Quality Control and acceptance plans shall conform to standardized sampling plans that include functional testing to confirm (1) the correct assembly of the system (2) the function of subsystem components and (3) transmission of all interface signals between sub-systems. Manufacturing and assembly controls shall include the establishment of capable processes with attention to continuous process improvement. The quality system shall contain a method for monitoring and controlling critical processes and product variation, including provisions for effective root-cause analysis and corrective action. **(OPA)**

3.6.5. Quality Consistency and Configuration Control Records. The FMBS-R/C contractors will maintain a listing of all subsystems produced by serial number. The configuration control record shall describe, by individual serial number any changes from the FRP baseline, and any changes cut into production at any point that materially deviate from the established baseline(s). **(OPA)**

3.6.6. Program Manger (PM) Control of Configuration. The PM shall use a configuration management approach to establish and control product attributes and the technical baseline across the total system life cycle. This approach shall identify, document, audit, and control the functional and physical characteristics of the system design; track any changes; provide an audit trail of program design decisions and design modifications; and be integrated with the Systems Engineering Plan and technical planning. **(OPA)**

Abbreviations and Acronyms

CAR-H	Combat Assault Rifle – Heavy (formerly SCAR-H)
CAR-L	Combat Assault Rifle – Light (formerly SCAR-L)
CBRN	Chemical Biological Radiological Nuclear
CLIN	Contract Line Item Number
COTS	Commercial-Off The Shelf
CQBR	Close Quarters Battle Rifle
EMD	Engineering and Manufacturing Development
FMBS	Family of Muzzle Brakes and Suppressors
FMBS-R/C	Family of Muzzle Brakes and Suppressors for Rifle and Carbine
FRP	Full Rate Production
G-NG	Go-No Go
HMMWV	High Mobility Multipurpose Wheeled Vehicle
IAR	Infantry Automatic Rifle
ICD	Interface Control Document
JORD	Joint Operational Requirements Document
KPP	Key Performance Parameter
KSA	Key System Attribute
LRIP	Low Rate Initial Production
NDI	Non-Developmental Items
O	Objective
ODC	Ozone Depleting Chemicals
OPA	Other Performance Attribute
ORD	Operational Requirements Document
OTB	Over The Beach
PM	Program Manager
QDSS	Quick Detach Sound Suppressor
SCAR-H	SOF Combat Assault Rifle – Heavy
SCAR-L	SOF Combat Assault Rifle – Light
SOPMOD	Special Operations Peculiar MODifications
SOF	Special Operations Forces

SRTA	Short Range Training Ammunition
SPL	Sound Pressure Level
T	Threshold
USSOCOM	United States Special Operations Command
UTM	Ultimate Training Munitions
WPNAC	Weapons Accessories